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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/675,120	09/30/2003	Tomomi Yoshizawa	KOY-0013	4966
23413	7590	11/23/2005	EXAMINER	
CANTOR COLBURN, LLP 55 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002			VO, ANH T N	
			ART UNIT	PAPER NUMBER
			2861	

DATE MAILED: 11/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/675,120

Applicant(s)

YOSHIZAWA ET AL.

Examiner

Anh T.N. Vo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

***NON-FINAL REJECTION***

The rejection over Owatari (US Pat. 4,489,334), Yoshizawa et al. (US Pat. 6,733,113) and Takeda et al. (US Pat. 5,944,917) are withdrawn in view of the amendments to the claim and the arguments presented in the amendment.

The prior art newly found necessitated a new ground of rejection as below:

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior arts are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 8-9, 12, 17, 24-25 and 28 are rejected under 35 USC 103 (a) as being unpatentable over Fujisawa et al (US 5,997,136) in view of Hitoshi (JP362288045A) and further in view of Kubota Corp (JP04107129A).

Fujisawa et al discloses in Figure 8 a printing device comprising:

- an ink cartridge (77);
- an ink jet recording head (81);
- an unmark ink supply tube connecting the head (81) and the cartridge (77); and
- wherein the driving frequency of the head is 15 KHZ, see lines 49-54, column 12.

However, Fujisawa does not disclose that the tube is made of a plastic material as recited

in claim 1, the average surface roughness of an inner surface of the tube is 200 to 2,000nm as recited in claims 1 and 17 or 400 to 1,000nm as recited in claims 12 and 28, or the driving frequency is 25KHZ or above as recited in claims 8-9 and 24-25.

Hitoshi suggests in Figure 2 a printing device comprising a plastic tube (6) connecting between a tank (9) and a head (5) for supplying stable deaerated ink to the head and to prevent the omission of dot, see the Abstract.

Kubota Corp, suggests in Figures 1-3 a plastic tube having high inner surface roughness for reducing the velocity of fluid flowed in the tube.

It would have been obvious to a person having skill in the art at the time the invention was made to employ the plastic tube as suggested by Hitoshi and making the tube inner surface rough as suggested by Kubota Corp. in the device of Fujisawa for the purpose of supplying stable deaerated ink to the head and to prevent the omission of dots, and for reducing the flow velocity of ink.

Although Kubota Corp does not specify the average roughness of the inner surface of the tube (39), i.e., between 200 to 2,000nm and Fujisawa does not specify that the driving frequency is 25 KHZ or above; however, a skilled artisan realizes that the roughness of the inner surface of the tube determines the flow velocity of the ink within the tube. Higher inner surface roughness of a plastic tube would reduce the ink velocity and higher driving frequency of the printhead would increase the printing speed of the printing device. Thus, selecting the optimum inner surface roughness or the driving frequency as claimed is considered to be a matter of a mechanical design expedient for an engineer depending upon the ink type, the size and shape of the printing device or a particular application in which the modified printing device of Fujisawa is to be used.. *In re Boesch*, 617F.2d272.205 USPQ 215 (CCPA 1980). Lacking of showing any criticality, it would have been obvious to a person having skill in the art at the time the invention was made to select the inner surface roughness of ink tube and the driving frequency of Fujisawa

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et al as claimed for the purpose of optimizing the ink velocity and increasing the speed of the printing device.

Claims 2-7, 10-11, 13-16, 26-27 and 29-32 are rejected under 35 USC 103 (a) as being unpatentable over Fujisawa et al (US 5,997,136) in view of Hitoshi (JP62288045A) and Kubota Corp (JP04107129A) as applied to claims 1 and 17 and further in view of Goto et al. (US Pat. 6,729,718), Konishi et al. (JP Pat. 02002256187A) and Konica (JP2004202706A).

Fujisawa et al in view Hitoshi and Kupota Corp. discloses a printing device with all of the limitations of the base claims as stated above but does not disclose that, i.e., the ink contains a colorant, water and a water-soluble organic solvent, the ink having a viscosity of 3.0 to 8.0 mPa.s; a surface tension of 20 to 35 mN/m; the colorant ink is a pigment; the ink contains 5 to 60 wt % of triethylene glycol monobutyl ether, 1,2-hexanediol, 1,2-pentanediol or t-butanol; an acetylene glycol-base nonionic surfactant; the ink having a foaming power of 100 mm or below; or a total content of calcium ion, magnesium ion and iron ion in the ink is 10 ppm or below.

Nevertheless, Goto et al. disclose ink using in a recording apparatus comprising:

- the ink containing a colorant, water and a water-soluble organic solvent, and having a viscosity of 3.0 to 8.0 mPa.s (column 26, line 8);
- wherein the ink containing a colorant, water and a water-soluble organic solvent and having a surface tension of 20 to 35 mN/m (column 28, lines 1-7);
- the colorant ink is a pigment (column 34, lines 21-22);
- wherein the ink containing 5 to 60 wt % of triethylene glycol monobutyl ether, 1,2-hexanediol, 1,2-pentanediol or t-butanol (column 25, lines 31-49); and
- wherein the ink containing an acetylene glycol-base nonionic surfactant (column 32, lines 22-32).

Konishi et al. discloses ink for an ink jet recording device comprising the ink having a foaming power of 100 mm or below (foaming power is 50mm, see Solution).

Oki et al discloses an aqueous ink comprising a total content of calcium ion, magnesium ion and iron ion in the ink is 10 ppm or below (column 19, lines 8-14).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the teaching of Goto et al., Konishi et al. and Oki et al into the modified printing device of Fujisawa for the purpose of providing an ink jet recording head having good discharge stability and good image quality.

It is noted that selecting “a contact angle of the ink to the inner surface of the ink supply tube, i.e., is to 10 degrees to 60 degrees or below, and the ink having a dissolved oxygen concentration of 2 ppm or below and/or 0.01 to 1 ppm or below and/or 4 ppm or below” appears to be as a design expedient for an engineer depending upon particular environment and applications in which the ink jet fluid supply is to be used since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable range involves only routine skill in the art. *In re Boesch*, 617F.2d272.205 USPQ 215 (CCPA 1980). Lacking of showing any criticality, it would have been obvious to a person having skill in the art at the time the invention was made to select the optimum contact angle and the optimum concentration for the ink of Fujisawa for the purpose of accommodating with the requirement of a particular application.

### ***Response to Applicant's Arguments***

The applicant argues that the Yoshizawa reference is not qualified prior art and Yoshizawa does not disclose the average surface roughness of an inner surface of the tube. The argument is persuasive. However, this limitation is suggested in the Kubota Corp. reference as stated above.

### ***CONCLUSION***

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Anh Vo. whose telephone number is (571) 272-2262.

The fax number of this Group 2800 is (703) 872-9306.

A handwritten signature in black ink, consisting of stylized, overlapping loops and a long horizontal stroke extending to the right.

**ANH T.N. VO**  
**PRIMARY EXAMINER**

November 20, 2005